

REMARKS

This paper is filed in response to the office action mailed on April 21, 2008. Claims 1-8 stand rejected in the office action; claims 1-8 have been amended; claims 9-10 are added; claims 1-10 are pending.

In the office action, the specification and abstract are objected to because of a number of informalities. In response, the specification and abstract have been amended to traverse these objections.

Next, claims 5-8 are objected to as being improper multiple dependent claims that depend from multiple dependent claims. In response, claims 5-8 and been amended to traverse this objection.

Claims 1 and 3 are objected to because of a number of informalities and the claims are further rejected under 35 USC §112, ¶2 as allegedly being indefinite. In response, all claims been amended to correct the informalities and address any §112 issues.

Finally, claims 1-4 are rejected under 35 USC §103 as being unpatentable over U.S. Patent No. 6,241,194 (Heiberg) in view of U.S. Patent No. 6,360,996 (Bockman). In response, claim 1 is been amended to traverse these rejections. Support for the amendments to claim 1 appear in the original application at ¶0049 and elsewhere. No new matter is added thereby.

Claim 1, as amended, is limited to three primary actuators including two control moment gyros and one Z-axis actuator, which may be a single reaction wheel as set forth in claims 4 and 7. The base reference for the obviousness rejection, Heiberg, discloses a system that requires two gyros and four rejection wheels. Specifically, Heiberg discloses "a control system of a vehicle comprising a reaction wheel array operable to provide a limited scanning motion for a vehicle on a plurality of planes ..." Heiberg at claim 1, column 4, lines 31-32. The four reaction wheels of Heiberg are shown at 40, 42, 44 and 46 and the two gyros are shown at 62, 64 in FIG. 2. No other embodiments are disclosed in Heiberg. As a result, to practice the embodiment disclosed in Heiberg, four reaction wheels 40, 42, 44, 46 and two control moment gyros 62, 64 must be employed for a total of six actuators. In contrast, claim 1 is limited to three primary actuators, half as many as required by Heiberg.

Heiberg also utilizes “the concept of a scissored pair of CMGs, but manufactured with less precision and less expensive materials” (column 2, lines 4-5), “to achieve both the slew and the scan missions” (column 3, lines 64-66), “with a lower quality or crude torque” (column 3, lines 64-66), while the reaction wheel array is used “to obtain precision three axis torque for scanning” (column 2, lines 4-5). Thus, the scissored pair CMG design choice of Heiberg requires the use of the four reaction wheels. In contrast, claim 1 requires only two control moment gyros for primary attitude changes as well as the necessary fine tuning which is clearly distinct from the system of Heiberg. In short, claim 1 provides a more simplified control system than disclosed in Heiberg and one that is more accurate. See ¶¶ 0026 and 0047 of the published application.

Thus, Heiberg fails to teach or suggest a control method using two control moment gyros and a single Z-axis actuator. Neither does the secondary reference, Bockman. Further, neither Heiberg nor Bockman teach or suggest how using only two control moment gyros with aligned gimbal axes and only one Z-axis actuator can work to provide the three-axis attitude control, in particular by limiting the range of variations of the angle (α) within a specified angular range $0^\circ < \alpha < 180^\circ$ as required by amended claim 1.

Accordingly, the obviousness rejection fails to establish a *prima facie* case of obviousness because the hypothetical combination of Heiberg and Bockman fails to teach or suggest every element of amended claim 1. To support an obviousness rejection, MPEP § 2143.03 requires “all words of a claim to be considered” and MPEP § 2141.02 requires consideration of the “[claimed] invention and prior art as a whole.” Further, the Board of Patent Appeals and Interferences recently confirmed that a proper, post-KSR obviousness determination still requires the Office make “a searching comparison of the claimed invention – including all its limitations – with the teaching of the prior art.” *In re Wada and Murphy*, Appeal 2007-3733, citing *In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) and *CFMT v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003).

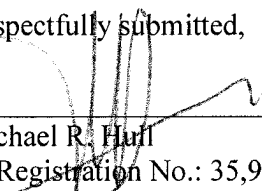
In summary, it remains well-settled law that an obviousness rejection requires at least a suggestion of *all* of the claim elements. Because the combination of Heiberg and Bockman fails to teach or suggest a dual control moment gyros/single Z-axis actuator control method that maintains the angle α between the angular momentum control vectors between

(and not equal to either) 0° and 180°, the obviousness rejections bases on Heiberg and Bockman are improper and must be withdrawn.

Accordingly, all rejections and rejections have been traversed and an early action indicating the allowability of this application is respectfully requested. The extension of time fee due was paid electronically with the filing of this paper. If any other fees are due, the office is authorized to deduct those fees from deposit account no. 50-3629.

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Respectfully submitted,

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